DYNAMIC OPERATIONAL PLANNING:

"INFORMATION PULL VERSUS INFORMATION PUSH"

A Monograph

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ABSTRACT

DYNAMIC OPERATIONAL PLANNING: "INFORMATION PULL VERSUS INFORMATION PUSH" by Major John J. Marr, USA, 46 pages.

This monograph examines how the U.S. Army compares to other complex systems in the use of information to solve problems. Like most complex systems, the U.S. Army strives to attain an informational advantage over its opponents. However, according to contemporary operational theory, concepts, and U.S. Army warfighting doctrine, the significance of this informational advantage is the rapid development and execution of singular, optimal solutions. Through a detailed analysis of how operational-level staffs organize and plan, against a model for measuring static versus dynamic information-use, this monograph demonstrates that current operational theory and doctrine results in a static operational planning process.

The structure of the paper validates this thesis by describing and comparing two complex systems – an operational planning staff and a professional football coaching staff – against a common model. This model, described in the first part of the paper, provides a process for evaluating a complex system's use of information on a static-to-dynamic continuum. The model conducts this evaluation by analyzing a system's organization, environmental interaction, and ability to learn. The second part of the paper describes how the two systems conceptualize and use information; an evaluation of current planning theory demonstrates 'conceptualization,' and an evaluation of planning organization and process demonstrates 'use.' The final portion of the monograph evaluates the two systems against the model, enabling a comparison of information use.

This monograph concludes that in terms of complex systems, the U.S. Army's current conceptualization and use of information results in static operational-level planning. The research contained in this monograph suggests that the U.S. Army could learn much from the example provided by American football teams. When compared to the complex system represented by a professional American football team, the U.S. Army's operational theory leads to relatively static state of organization, interaction, and improvement. In other words, with regard to information-use, current operational theory elicits a dysfunctional organization and reactive doctrinal planning process. In order for the U.S. Army to fully embrace its full potential for information-use, it must understand how to use information dynamically.

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CHAPTER 1

Introduction

Knowledge in war is very simple, being concerned with so few subjects,
and only with their final results at that. But this does not make its application easy.[1]

- Carl Von Clausewitz, *On War*

That other team. That's what complicates your thinking.[2]

- John Madden, *One Knee Equals Two Feet*

Problem Background

On 19 September 1994, after months of planning, the United States initiated Operation

Uphold Democracy to assist in the reinstatement of Haitian President, Jean-Betrand Aristide.

The U.S. force, controlled by the U.S. Atlantic Command (USACOM), included two separate

Joint Task Forces (JTFs) and incorporated elements of all four services. The U.S. Army's XVIII

Corps and 10th Infantry Division (Mountain) provided the two sets of headquarters, designated as

JTF 180 and JTF 190 respectively.[3]

Uphold Democracy fits the definition of Military Operation Other than War (MOOTW).[4]

However, the crisis planning conducted throughout the summer by the staffs of USACOM and

XVIII Corps began very differently. Based on their perceptions of strategic guidance, the

operational setting, and expectations of resistance, Uphold Democracy planners initially

developed a full-combat option to suppress the military junta responsible for forcing Aristide's

departure. Once the junta was defeated, the 10th Mountain would deploy as a Peace Support

Force (PSF) to oversee a peaceful transition of power. As late as 1 September, ACOM and XVIII

Corps planners still regarded an "invasion [as] imminent."[5]

Two and half weeks before the deployment, the situation began to change. As the National

Command Authority (NCA) continued to press for diplomatic solutions, the Joint Staff directed

ACOM and XVIII Corps to develop more options, starting a frenzied cycle of plan refinement.[6] Beginning on 2 September and continuing through to the 19th, the planners at ACOM, XVIII Corps, and the 10th Mountain struggled with the frustrating task of developing a new plan, while simultaneously preparing their units to deploy. Not surprisingly, the hard work and frustration of these operational staffs, intensifying during the first weekend in September, went on largely unnoticed. In fact, a large percentage of the American public were focused on a different type of "operations." This weekend was also the start of the 1993 professional football season.

Working hard, the combined staffs completed a "just-in-case" plan as forces began to deploy to pre-position locations.[7] On 15 September, the President authorized execution of the original OPLANs, designating 19 September as D-day. However, on D-1 a high profile contact team authorized by the President secured a last-minute, peaceful agreement.[8] Combat forces – already moving toward their objectives – were recalled, as planners "realized that they had less than twelve hours to come up with a new OPLAN – one that merged the original OPLANS with the "just-in-case" option.[9]

D-day, September 19, 1994 was a Monday. While the *complex system* of military commanders and planners at ACOM, XVIII Corps, and the 10th Division spent the summer preparing for this day, a different group of *complex systems* – represented by the coaching staffs of the 30 professional American football teams – had been preparing for operations of their own. That evening, as the JTFs deployed into Haiti, two of these other systems – the Dallas Cowboys and the Detroit Lions – faced off in a contest of wills involving degrees of complexity, and uncertainty similar to the situation confronting the planners of Operation Uphold Democracy.

The Cowboys-Lions game played on Uphold Democracy's D-day provides a fitting example of the uncertainty inherent in all conflict. Although the Dallas team had undergone an off-season change of coaching staffs, the key players were the same and most experts still regarded the Cowboys' as "implements of destruction" on their way to establishing a "dynasty."[10] The high-powered offensive and defensive formulas executed by the Cowboys enabled them to win their

last 10 contests. However, by employing a high-tempo "run-and-shoot" offense designed to nullify the Cowboys' defensive squad, the Lions pulled off a stunning upset.[11]

This coincidence of dates, however, is not the only similarity between military operations and football. Football and military operations are alike in many ways – offensive spirit, physical brutality; even the terminology is largely the same. Given all this, football provides an apt analogy to warfare. In the words of the distinguished French Marshall Foch, after witnessing his first game on a visit to the United States after World War I: "*Mon Dieu*, this game *is* war!"[12]

Transcending these obvious comparisons, however, the most significant similarity between military operations and football is the mental and physical interaction of opposing wills. In both military operations and football, commanders (coaches) and staffs use all available resources to out-think and out-smart a resistant opponent. Therefore, a detailed analysis of the similarities between military operations and American football enables an insightful examination of how the U.S. Army compares to other complex systems in the use of information to solve problems.

Like most complex systems, the U.S. Army strives to attain an informational advantage over its opponents. According to the theory of warfighting envisioned in the U.S. Army's *FM 3-0*, the most effective use of information superiority is the development of decisive operational plans that impose the commander's will on the enemy. Superior situational understanding, combined with the experience of operational commanders, necessarily leads to better decisions concerning the planning and execution of campaigns. In other words: better information, gathered faster than an opponent, leads to a better course of action.[13]

However, the example of the planning for Operation Uphold Democracy questions the validity of this theory. Is this the best use of information? Even with the potential advantage of "information superiority," can an operational-level unit determine with any certainty that one future sequence of actions is better than another sequence? The ways that other systems use information – systems equally committed to attaining information superiority – suggest a different solution.

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Arguably, professional football teams apply a level of time, effort, and resources towards establishing information superiority, which is analogous to military operations. Watching game films, compiling statistics, and conducting opposing-player assessments are all routine examples of how a professional coaching staff prepares for a game. Where football teams differ, however, is the manner in which coaches and players incorporate this information into game planning.

Rather than developing a single COA – a set string of plays – football teams use information to develop option-sets: separate offensive (and defensive) formations designed to incorporate the execution of several individual plays. Different option-sets accommodate different situations (such as first down vice third downs), and build an inherent element of deception. Football teams continue their information-integration process to the point of execution; quarterbacks select a specific play from an option set only after seeing how the defense responded to the offensive formation. The flexible use of information in planning and the process of information assessment that continues to the point of execution suggest that pro football – as a system – conceptualizes and uses information differently.[14]

The planning for Operation Uphold Democracy suggests that examining these different concepts of information and determining their effects on operational planning are relevant to the military professional for two reasons. First is the tendency of units to abandon or change plans at (or just after) the point of execution. Basing decisions on analysis, presumptions, and anticipated actions, operational units can find that selected COAs are obsolete before H-hour.

A second reason for examining information use concerns the expressed needs of strategic-level leadership. Sometimes, given the ambiguities and uncertainties of a situation, the U.S. NCA requires a range of acceptable options, rather than a single, optimal course of action.

Problem Statement and Scope

This monograph examines how the U.S. Army compares to other complex systems in the use of information to solve problems. Based on the presumption that a dynamic use of information is

better than a static use of information, the paper evaluates an operational planning staff against a theoretical model for measuring a system's use of information. Specifically, the paper answers the following question: does the U.S. Army's current conceptualization and use of information result in static operational planning?

Answering this question necessitates several things. First, a model for analyzing and measuring the use of information must be established and explained. Second, the answer requires a definition of how complex systems *conceptualize* and *use* information. For the purposes of this paper, *conceptualization* equates to a system's theories, operational concepts, and/or doctrine of how information is used.[15] *Use* of information equates to the actual processes of planning action and controlling execution during conflict. Due to the specifications of a monograph, analysis is limited in that the examination of operational planning focuses on contingency planning, rather than the lengthy and more detailed processes used to support budgeting and non-time sensitive OPLAN development.

Thesis Statement

As a complex system, the U.S. Army's current conceptualization and use of information results in static operational-level planning. The research contained in this monograph suggests that the U.S. Army could learn much from the example provided by American football teams. When compared to the complex system represented by a professional American football team, the U.S. Army's operational theory leads to relatively static state of organization, interaction, and improvement. In other words, with regard to information-use, current operational theory elicits a dysfunctional organization and reactive doctrinal planning process. In order for the U.S. Army to fully embrace its full potential for information-use, it must understand how to use information dynamically.

CHAPTER 2

Information and Control

Though the art of thinking is a very ancient art, and though logic has controlled philosophy and science for hundreds of years, logical thought has not been applied to war, except by a very few...[1]

J.F.C. Fuller, *The Foundations of the Science of War*

There is no doubt that football errs on the side of the portentous and complex.[2]

James Lawton, *The All American Wargame*

The purpose of this chapter is to examine information from a theoretical standpoint. Such an examination enables the development of a model for measuring information use in terms of static versus dynamic. Furthermore, this model will provide the necessary analytical framework for the assessment of this paper's fundamental research question.

Webster's defines *information* as "1) timely or specific knowledge that is derived or acquired; 2) the act of informing."[3] Establishing a single, specific definition of *information* is not the purpose nor intention of this paper. In fact, as subsequent discussion demonstrates, it is probably more important to realize that information <u>can</u> mean different things. What is germane to this research is an examination of the nature of information as it relates to the function of complex systems. Specifically, this chapter provides a description of some of the characteristics of information, and analysis of how (and why) complex systems use information. This examination enables the development of a model that measures how systems use information.

However, before examining *how* complex systems use information, it is important to recognize some of the characteristics of information. These characteristics provide insight into how complex systems distinguish between good information and bad information. Three characteristics affect this research – namely that information is time-sensitive, impartial, and illogical.

The first characteristic of information is time-sensitivity. Time-sensitivity refers to the fleeting nature of information – something that is true now, may be false later, something that has meaning now, may be obscure later. For this reason, complex systems can measure the value placed on information with regard to time.

Another characteristic of information is impartiality. Information is objective rather than subjective – the same element of information can mean different things to different parts of a system. (For example, one person hears music – another person hears 'noise.') For this reason, the value of information is relative to a system's ability to transfer it – if one part of system has information pertinent to another part, but the system cannot (or does not) transfer the information, then the information may lose value.

The final characteristic is that information is not subject to normal logic. Specifically, *more* information does not necessarily equal *less* uncertainty.[4] Observations in numerous studies on the use of information, suggest that large amounts of information may be counter-productive and complicate processes for determining relevancy.[5] Therefore, although a small amount of information may help, it does not logically follow that a large amount of information will help more.

All three of these characteristics illustrate how systems assign value to information; in other words, how they designate *relevant* information. However, the interactive nature of systems suggests that the true value of information – relevancy – stems from how information is used. According to systems theory, a complex system is a collection of smaller systems that interacts, both internally and externally, through the exchange of information.[6] By exchanging information, the "actions of all complex systems are controlled and modulated."[7] Therefore, the primary value of information to a complex system is that it enables control, the "purposive influence towards a predetermined goal."[8] Study of the relationship of information to control within complex systems is known as Control Theory.[9]

Control theory posits that by using information to "compare present states with future goals," complex systems are able to monitor and direct the actions of separate elements.[10] Furthermore, it cites a system's "ability to maintain control" as "directly proportional" to its ability to transfer information.[11] Stated succinctly, without information-transfer, a system has no control, and without control, the system no longer has the ability to function. Analysis of Control Theory suggests three general functions for which systems use information: *organization, interaction,* and *improvement.* These three functions describe the basic ways that systems transfer and process information, both internally and externally.[12]

The first function, *organization,* refers to the ways in which systems use information internally. Organization incorporates all the networks, processes, and structures that a system uses to transfer and process information between separate elements. The organization function includes the ways a system establishes an information flow, how it describes itself and its environment, and how it distributes and manages tasks.[13]

The second function, *interaction,* refers to the way in which systems use information externally. Interaction incorporates many of the same actions as organization. However, interaction also accounts for the acquisition and projection of information to and from the system.

The third function, *improvement,* refers to the way in which systems use information to learn. Complex systems possess "a great many independent agents interacting with each other in a great many ways," allowing the "system as a whole to undergo spontaneous self-organization."[14] Self-organizing systems become "adaptive, in that they...actively try to turn whatever happens to their advantage."[15] Improvement describes the information-function that enables systems to analyze, learn, and decide.

Common to these three information-functions, is that each must be actively present and observable for a system to continue to function. As noted above, loss of information transfer equates to loss of control, and loss of control equates to an organizational "breakdown."[16] Therefore, these three functions serve as ideal measurements for information use.

In his book *The Control Revolution*, James Beniger asserts that complex systems must

employ control *dynamically* in order to ensure their survival.[17] His model of the "Analytical

Dimensions and Empirical Properties of Living Systems" (see Appendix 1) illustrates this

process. In the explanation of his model, Beniger contends that successful systems are dynamic

(and less successful systems are static) in three categories: existence, experience, and evolution:

> For existence, where the problem is to maintain organization…the
> solution involves programmed control distributed throughout the
> system. For experience…where the problem is to pursue goals in
> interaction with the external environment, the solution involves…the
> capability to reweight contingencies. For evolution, where the
> problem is…goal-directed modifications, the solution involves…
> variation that might be differentially selected.[18]

These categories parallel the three functions of information-use identified above –

organization, interaction, and improvement.[19] Given that Beniger's model measures control, this

parallelism enables a suitable structure for evaluating whether systems *use* information statically

or dynamically. By adapting the model to focus specifically on the use of information – in the

categories of organization, interaction, and improvement, it is possible to assess whether a

complex system uses information statically or dynamically. Figure 1, below, provides a graphic

depiction of measuring static versus dynamic use of information.

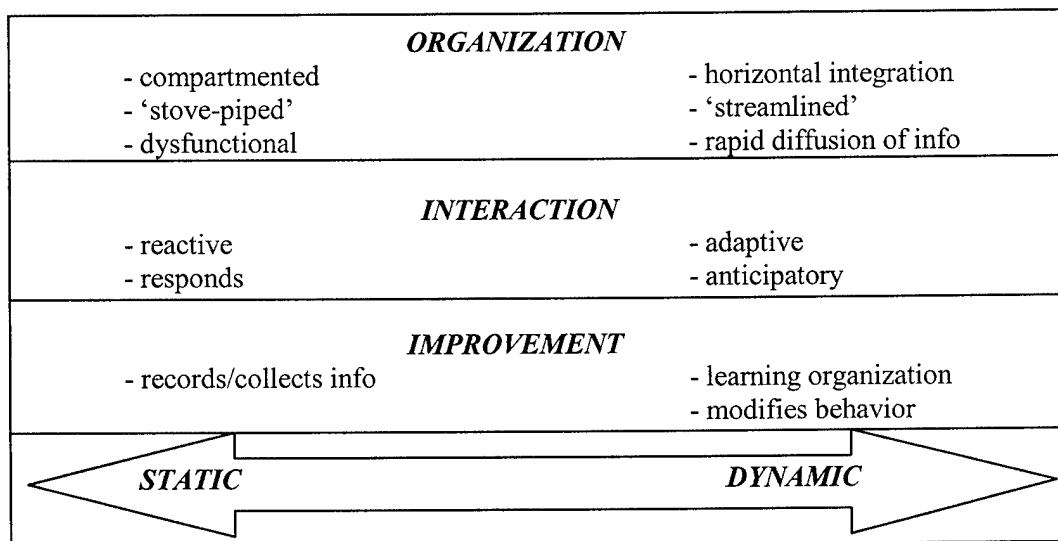| ORGANIZATION	
- compartmented	- horizontal integration
- 'stove-piped'	- 'streamlined'
- dysfunctional	- rapid diffusion of info
INTERACTION	
- reactive	- adaptive
- responds	- anticipatory
IMPROVEMENT	
- records/collects info	- learning organization
	- modifies behavior
STATIC	*DYNAMIC*

Figure 1 – Static versus Dynamic Use of Information

Based on this model, a complex system's use of information is assessed as either static or dynamic depending on how it uses information to organize, interact, and self-improve. Because each criterion incorporates several corresponding factors, the model represents a relative continuum of measurement, not an absolute. For example, a system might have a compartmented structure of organization, but still manage to execute rapid transferal of information. Furthermore, since the model assesses information flow in a complex system (a system-of-systems), inefficiencies in one element negatively affect other elements, and thus the greater whole. A specific explanation of each criterion follows.

Organization. As a criterion of evaluation, *organization* assesses how a complex system processes and distributes information internally. In other words, *organization* is a measurement of a system's ability to affect internal control.[20] Systems with a static organization are dysfunctional – some portion of their process for information transfer blocks, slows, stops, or prevents internal communication. Several factors can contribute to the dysfunctional state of a system. For example, 'stovepipe' organizational structures cause barriers to the exchange of information referred to as "internal borders."[21] Furthermore, some elements can even willfully withhold information from other elements, based on grounds of secrecy, specialized-knowledge, and even crossed-purposes.

In addition to creating information barriers, compartmentalization of a system increases difficulties in determining the relevancy of information. Separating elements of a system by function gives rise to the specialization of skills and the tendency to focus on specific information-types. This specialization of skills reinforces 'internal informational borders,' and inhibits an element's ability to understand how its specific information relates to the requirements of the greater system.

Conversely, systems with a dynamic organization exhibit "effective communication" and "diffuse needed information quickly and effectively."[22] Dynamic organizations actively seek to reduce barriers between and within subordinate elements, with the goal of leveraging the

"everyone as a knowledge worker."[23] Further, the elements of a dynamic system evidence a "sense of shared purpose" that transcends the specialization of separate elements.[24] Having a shared purpose enables dynamic systems to understand how the time-sensitive aspect of information relates to the concept of impartiality. This means understanding that *speed* of information exchange is only good if *relevant* information gets to the *right places*. Dynamic organizations achieve relevancy by fostering the interaction of separate elements.

Interaction. *Interaction* measures the ability of a system to gather and project information within its environment. Interaction involves many of the same factors as organization; the significant difference is orientation – organization is internal, interaction is external. Static organizations react to external factors with "innate, automatic, [and] fixed" or pre-programmed processes. designed to respond to normal, 'forecastable' situations.[25] The information they derive from the environment is highly selective and supports an internally focused program. Preprogrammed systems might gather information quickly, but because interaction is reactive – they are still considered static.

Dynamic organizations, on the other hand, are environment-sensitive, and adapt to changing circumstances. By proactively adapting to environmental change, dynamic systems move beyond normal time-sensitivity (speed) – they anticipate or preempt action. Truly dynamic organizations leverage the ability to anticipate action by using information to shape the perception of others within the environment. Anticipation infers that dynamic systems are able to predict or forecast events in the environment. However, systems also achieve this dynamism by being better prepared. This means that knowing or predicting a particular future event is not as important as being prepared for any possible future events.

Improvement. Assessing a systems improvement means measuring its ability (and willingness) to learn. As with the previous two criteria, systems measure improvement on a continuum of static to dynamic. Static systems only use part of the potential of information – they collect, record, analyze, and comprehend information, but they fail to act on what they know. The

inflexible processes of traditional bureaucracies create static systems that are unable to use information to learn. The traditional bureaucratic mentality views information as a 'thing,' or a 'possession.' This mentality infers that mere possession of information equate to knowledge. These assumptions ignore the illogical nature of information.[26]

Dynamic systems modify behavior based upon the acquisition of relevant information. These systems view information as a systemic process of purposeful interaction that enables learning. Dynamic use of information for improvement incorporates "double-loop learning" (learning that analyzes a problem and the factors or conditions that led to the problem).[27] Further, dynamic systems understand the characteristics of information and employ flexible processes to ensure relevancy.

The analysis of this chapter establishes a logical framework for evaluating how complex systems use information. To summarize, systems use information in three distinct ways to control themselves and their environments – by organizing, interacting, and improving. In order to answer the fundamental research question of this monograph, these categories of information use will serve as the criteria for evaluating how both operational-level planning staffs and professional American football teams – complex systems – use information. The first complex system – the operational-level staff – is the subject of the next chapter.

CHAPTER 3

How the U.S. Army Uses Information

The situations that confront a commander in war are of infinite variety. In spite of the most careful planning and anticipation, unexpected obstacles, frictions and mistakes are common occurrences in battle.[1]

Field Service Regulations 100-5, Operations (1941)

The most important teaching concept the coach can put across to his quarterback is to be prepared. All quarterbacks must be taught that chance favors a prepared mind. The winning quarterback is always ready for the unexpected.[2]

Jack Olcott, *Coaching the Quarterback*

The purpose of this chapter is to describe the current U.S. Army *conceptualization* and *usage* of information for conducting operations. An examination of current/emerging operational-level theory, concept papers, and doctrine will demonstrate *conceptualization*. An examination of current operational-level planning processes demonstrates the *usage* of information.

The sources of this examination were four-fold. First, a review of trends in command and control (C2) research and the observations of operational theorists such as Dr. James Schneider and Martin Van Creveld provided relevant insight on current operational-level theory. The second source includes operational vision and concept documents such as *Joint Vision 2020*, Training and Doctrine Command Pamphlet (TRADOC Pam) 525-5, *Force XXI Operations*, and TRADOC Pam 525-75, *Intel XXI: A Concept for Force XXI Intelligence Operations*. The third source was the depiction of emerging Army operational-level doctrine provided by the final draft edition of Field Manual (FM) 3-0, *Operations* (1 October 2000). Finally, Joint Publications (JPs) 5-00, *Doctrine for Planning Joint Operations*, JP 5-03.1, *Joint Operation Planning and Execution System, Vol. I*, and JP 5-00.2, *Joint Task Force Planning Guidance and Procedures*, demonstrate how the Army actually uses information during operational-level planning situations.

A review of the concepts presented by current operational theorists and concept documents – the sources outlined at the beginning of this chapter – reveal a common set of themes about the

use of information. These themes provide insight into how the Army regards the concept of information and, therefore, enable an understanding of how (and why) the Army uses information. An explanation of these themes follows.

The first theme common to current operational theory is that *the value of information is directly proportional to its ability to support the commander's plan.* Operational theory holds that the commander's plan – what he intends a force to do in the future – is the primary means by which military organizations exert control.[3] Plans are the key unifying element of systemic action, the "crystallization of the will of the commander in his attempt to control the future."[4] Therefore, information is subordinate to planning – information is only valuable (relevant) when it supports what the commander wants to do.[5]

Current operational concept documents emphasize this subordinate relationship of information to a commander's plan. In its description of "Dominant Maneuver", Joint Vision 2020 posits that information "supports dominant maneuver" through "concurrent planning; coordination of widely dispersed units; gathering timely feedback on…subordinate units; and [development] of the course of action leading to mission accomplishment."[6] TRADOC Pam 525-75 echoes this idea, stating that the sole purpose of information is to focus the "entire intelligence system…within the context of the commander's intent and scheme of maneuver."[7]

The subordination of information to planning shapes an operational staff's specific information requirements. Since the focus of planning is on the commander's intended action, a staff might consider information about *other* possible actions as less relevant. In other words, *the commander determines the relevancy of information for the staff.* This concept of relevancy leads to a second theme common to current operational theory.

A second theme common to current operational theory and concepts is that *relative certainty about a given situation is possible through the use of relevant information.* This theme is most prevalent in the branch of operational theory that deals with command and control (C2 theory).[8] This theme – described as the historical "quest" of command – has existed for centuries.[9]

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Operational C2 theorists contend that while knowing everything about a situation might not be possible, knowing enough about a situation is.[10] The difference is philosophical; but it is important. This contention drives C2 theory – and subsequently the systems that ascribe to C2 theory – to overemphasize how (and how much) a staff transfers and collects information and de-emphasizes the determination of information's relevancy. Current C2 theory is based on a formulaic precept: $U = I_N - I_A$ (Uncertainty = 'Information (needed)' minus 'Information (acquired)').[11] I_A is easier to fix; "better sensors, algorithms for data fusion, data bases, and networks have been improving the collection" of information for years.[12] However, I_N is situation-dependant, difficult to model, and is therefore largely ignored.[13]

The operational concepts expressed in TRADOC Pam's 525-5 and 525-66 echo the theoretical emphasis on technical and process solutions over understanding and developing information-relevancy. These concept papers hold the ability to "gain information" as "the main imperative guiding future operations."[14] "Future information technology" and "near-realtime, continuous visualizations of the battlespace" are seen as the effective ways to increase certainty.[15]

Emerging doctrine also reflects this trend. *FM 3-0* fuses the technological with the procedural, highlighting the importance of information processes over information content. In its explanation of "Situational Understanding" (SU), *FM 3-0* describes how technology enables processed data to become knowledge, electronically disseminated knowledge provides a Common Operational Picture (COP), and a shared/analyzed COP results in SU.[16] Although *FM 3-0* introduces the idea of a Common Relevant Operational Picture (CROP), the manual's definition of relevancy ("all information of importance to commanders and staffs") does little to help staffs distinguish what specific information is relevant.[17]

In the summary of Van Creveld's book about the historical "quest for certainty," he concludes, "certainty is, a priori, impossible."[18] Current C2 theory and operational concepts accept this historical fact, but still see value in continuing the "quest" of trying to disprove it.[19]

One aspect of value gained from this 'quest' is the discovery that although relative certainty is preferred, attaining an information-level superior to an opponent is the only requirement.

Attaining a relative advantage through superior information processing is the third trend common to operational theory and concepts. This trend is the theoretical foundation of the operational concepts of Information Superiority (IS) and Information Dominance (ID). Current operational concepts and emerging doctrine hold that IS is "the operational advantage derived from the ability to collect, process, and disseminate an uninterrupted flow of information while exploiting or denying an adversary's ability to do the same."[20] Information Superiority is the "key enabler" of Full Spectrum Dominance.[21] As noted in the definition above, units achieve IS through the dual axes of: 1) enhancing friendly awareness while, simultaneously, 2) reducing enemy awareness.

In examining the "cybernetic domain" of warfare, theorist James Schneider points out that striving for Information Superiority is the one practical use of information in war.[22] Active steps taken to degrade an opponent's ability to effectively control itself result in a paralysis of control. Schneider asserts that military systems impose this paralysis or "cybershock," by destroying C2 systems, achieving surprise, and processing information faster than an opponent does.[23]

Although it does not use the term cybershock, *FM 3-0* echoes Schneider's assertions, citing the value of targeting an adversary's C2 structure/processes as increased friendly initiative and decision-making speed.[24] In fact, this doctrine emphasizes the requirement for "better, faster decisions," suggesting that this leads to an increased operational tempo. Modern information systems and technological advancements are described as critical components in achieving this "decision superiority."[25] The emphasis placed on decision-speed and technological enablers as a requirement for achieving Information Superiority is also present in *Joint Vision 2020*, TRADOC Pam's 525-5, and 525-75.[26] However, viewing Information Superiority as a manageable item with logical inputs and outputs suggests a fourth trend.

The last trend common to operational theory and concepts is that *information is a quantifiable object.* As noted in the previous chapter, conceptualization of information as a 'thing' is a logical outgrowth of traditional bureaucracies. The fact that contemporary operational theory and concepts classify information as an object is obvious throughout all the previously mentioned sources. For example, Joint Vision 2020 categorizes information into "environments," "systems," and "networks."[27] TRADOC Pam 525-5 asserts that information is an asset equivalent to soldiers, an element to be "mastered." FM 3-0 discusses Information Management at length and even goes as far as to break all information down into four specific categories.[28] Clearly, operational theory considers information to be a quantifiable object.

To summarize, a review of current operational theory and conceptual literature reveals four trends that describe how the Army conceptualizes information. Specifically, in terms of complex systems, the Army values information in terms of how well it supports the commander's plan; it sees the primary use of information as the development of relative certainty; it seeks to gain an informational advantage over adversaries; and it views information as an object. Considered as a cohesive set, these four trends provide a critical insight into why Army planners use information the way they do.

Since operational theory relates the value – or relevancy – of information to its ability to support the commander's intent, planning is the primary way that operational planners use information. According to current doctrine, the operational-level of war is inherently joint; therefore, this analysis focuses on the planning processes in joint doctrine.[29] Specifically, this analysis: 1) examines the structure of operational planning groups, and 2) describes the sequential phases of crisis planning, highlighting the specific uses of information in terms of inputs and outputs.

"Joint operational planning is a coordinated process used by a commander to determine the best method of accomplishing the mission."[30] The Joint Operation Planning and Execution System (JOPES) is the overarching process for the conduct of operational planning. In peacetime,

operational staffs conduct *deliberate planning* to develop contingency plans in response to likely

threats and to support the budgetary forecasting process. In crises, however, staffs modify the

deliberate process with Crisis Action Planning (CAP). CAP procedures assist operational-level

staffs with the refinement of existing plans, or the development of new ones. Basically, CAP is

an adaptation of the deliberate planning process in response to crises and time-sensitive

situations. Therefore, crisis planning incorporates the same operational functions as deliberate

planning. [31]

As noted above, operational planning infers the use of joint forces. However, the U.S.

military has few *permanently* organized joint staffs capable of conducting this type of planning. [32]

In crisis action situations, the Joint Chiefs of Staff direct the establishment of a Joint Task Force

(JTF) on a "geographical or functional basis" to conduct missions with a "specific limited

objective." [33] Therefore, most operational planning staffs are "ad hoc" organizations, requiring a

deliberate "building process" in order to ensure unity of effort. [34]

This ad hoc nature creates two challenges for operational staffs with regard to the use of

information. First, the members of the staff may be unfamiliar with each other and therefore

unsure of the particular expertise, training, and knowledge levels available to the staff. Joint

doctrine suggests the use of "boards," and "cells" to unite staff members into functional

categories, and "joint planning groups (JPGs)" to synchronize the complex efforts of the different

cells. [35] Appendix 2 shows an example of a typical joint operational planning staff.

The other challenge planners face is the likelihood of JTF staffs to become quite large.

Although the synchronizing efforts of JPGs offset the complexity of a large staff somewhat, joint

staffs face extreme challenges in sharing information in order to coordinate effort. The individual

members and subordinate cells of operational planning staffs may even be physically separated,

communicating with each other by phone, computer, or video. [36]

Before examining the specific steps in crisis planning, it is important to note how deliberate

planning affects CAP. By "anticipating potential crises and developing contingency plans that

facilitate...rapid deployment," analysis conducted during deliberate planning can restrict the development of options.[37] For example, staffs planning contingency operations could be limited to using the "forces and resources specified" by deliberate planning.[38]

According to *JP 5-03.1, Joint Operation Planning and Execution System*, CAP provides a logical sequence of actions and designates specific responsibilities for action within the larger Joint Planning Community. CAP procedures provide for "rapid...exchange of information...timely preparation of courses of military COAs...and the prompt transmission of decisions..."[39] These steps, augmented by the JTF "specific planning process" steps outlined in *JP 5-00.2*, provides operational staffs with a specific listing of responsibilities, actions to consider, and decisions to make.[40] Figure 2, below, outlines the six phases of CAP.

PHASE I	PHASE II	PHASE III	PHASE IV	PHASE V	PHASE VI
SITUATION DEVELOPMENT	CRISIS ASSESSMENT	COA DEVELOPMENT	COA SELECTION	EXECUTION PLANNING	EXECUTION
EVENT					
EVENT OCCURS WITH NATIONAL SECURITY IMPLICATIONS	CINC'S RPT/ ASSESSMENT RECEIVED	CINC PUBLISHES WARNO	CJCS PRESENTS REFINED COA TO NCA	CINC RECEIVES ALERT ORDER OR PLANNING ORDER	NCA DECISION TO EXECUTE OPORD
ACTION					
- MONITOR SITUATION - PROBLEM RECOGNITION - SUBMIT CINC ASSESS	- INCREASE AWARENESS - JCS ASSESS - JCS ADVISES NCA ON MILT ACTION	- DEVELOP COAs - EVAL COAs - CREATE/MODIFY JOPES DATA-BASE - CINC ASSIGNS TASKS - US TRANSCOM PREPARES DEPLOY EST. - JCS REVIEWS CINC ESTIMATE	- CJCS ADVICE TO NCA - CJCS PUBLISH PLANNING ORDER	- ADJUST JOPES DATABASE - ID MOVE REQ'S - ID/ASSIGN TASKS - CONVERT COA TO OPORD - RESOLVE SHORTFALLS - JCS MONITORS OPORD DEV.	-CJCS SENDS EXECUTE ORDER - CINC EXECUTES ORDER
OUTCOME					
- ASSESS IMPACT OF EVENT	- NCA/JCS DECIDE TO DEV MILITARY COA	- CINC RCMDs SINGLE COA	NCA SELECTS COA - CJCS SENDS ALERT ORDER	- CINC PUB'S ORDER	- CRISIS RESOLVED

Figure 2 – The Crisis Action Planning Process[41]

The purpose of CAP is development of an option for the National Command Authority (NCA) – the process begins with a "well-defined" explanation of a desired endstate.[42] The heart of the process involves the development of "no more than three" courses of action, and subsequent analysis of these options against the enemy's likely plan. Staffs identify possible subsequent actions, but do not analyze or plan for them. The result of the process is a commander's recommendation, to the NCA, of the best possible plan.[43]

Throughout CAP, the operational staff uses information to understand the situation, develop and analyze potential solutions (COAs), and then communicate a single, recommended solution. The manner in which these staffs organize, and the process that they employ, are direct reflections of the four trends in operational theory concerning information use illustrated in the previous section.

The staff places value on information in terms of how well it supports the commander's plan. The doctrinal insistence on a "well-defined" strategic and military "endstate" illustrates this trend.[44] Endstates focus the staff on what the NCA wants done, instead of what is possible. Furthermore, the commander issues guidance "stating what options to consider," and designating what information he deems "critical."[45] All information collection, presentation, and analysis focuses on the needs of the commander.

The staff uses information to develop relative certainty. The entire planning process, as outlined in JP 5-00.2, assumes that relative certainty is possible. The process' fundamental output – a single, optimal course of action – embodies this idea. Instead of examining all possible solutions, the process stipulates creating only three; instead of considering all actions available to an adversary, the process stipulates using the most likely.[46] The commander's recommendation to the NCA represents an idea of relative certainty.

The staff seeks to gain an informational advantage over adversaries. During operational planning, the staff incorporates the attainment of informational advantage by planning

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"information operations" (IO) as an adjunct to each COA. Special subcomponents to the operational staff – "IO cells" – develop these complementary plans.[47]

The staff views information as an object. The categorization of information as an object is inherent to the structure of an operational staff. Staff members are segregated into specific compartments, each responsible for attaining, synthesizing, and analyzing separate types of information.[48]

The analysis describes how the U.S. Army conceptualizes and uses information. Current operational theory, concepts, doctrine, and procedures provide a congruent manner of conceiving and using information: Information focuses on the plan, creates relative certainty, enables superiority, and is viewed as an object. However, is this a dynamic use of information? The next chapter provides a point of comparison.

CHAPTER 4

How Professional Football Teams Use Information

On the fields of friendly strife are sown the seeds that, upon other fields, on other days will bear the fruits of victory.[1]

<div align="right">Douglas MacArthur</div>

Victory goes not only to the strong and brave, but to boys who think. Football is played with the arms, legs, and shoulders – but mostly above the neck![2]

<div align="right">Knute Rockne</div>

This chapter describes how American football professionals *conceptualize* and *use* information in the course of planning, preparation, and execution. This provides a point of comparison for the analysis of operational planning. A description of football coaching theory and methodologies will demonstrate conceptualization. An examination of how coaches actually plan and execute games demonstrates information-usage. Examining football as an analogy of war provides an opportunity for military professionals to analyze how a different complex system plans for conflict from a fresh perspective. The appropriateness of this comparison is enabled by the overwhelming similarities between the two complex systems and their. For example, both systems use physical force, or the threat of force, to impose their will on a resistant, adaptive threat. Contextually, both systems organize themselves to operate in the "full spectrum" of their environment - operational units conduct engagements, battles, operations and campaigns, football teams conduct plays, drives, games, and seasons.[3] Football:

> "has everything to thrill a military mind. It has the trench warfare of
> the behemoths who crouch on the line of scrimmage...like infantrymen
> trying to win a little ground, a little time. It has the outriders, the
> receivers, ghosting through lines of defense. It has the running backs
> who operate as armor..."[4]

Football even has a political dimension; coaches – like operational commanders – must cope with the pressures and influences of a 'command authority' (owners), the media, and public support.[5]

One significant way in which the two systems differ is operational-intensity. When compared to military operations, American football has an accelerated nature of conflict; professional teams conduct their 'operations' (games) every week during football season. This accelerated nature gives football planners a deeper level of experience in dealing with their environment, and provides football professionals with a perspective on the use of information that differs markedly from military theorists and planners.

The history of football reflects this accelerated operational intensity through a continual cycle of action-counteraction – a coach develops a new offensive play, and the opposing coach adjusts his defense to counter it. "Great ideas are countered by great ideas...the only constant is the countering."[6] This cycle has continued to evolve - play after play, game after game, season after season – since the game was first played in 1869[7] Given this extensive experience with the historical cycle of action-counteraction, football planners have learned to accept uncertainty, and prepare accordingly.

Like the review of operational theory in the previous chapter, analysis of football planning theory reveals a common set of themes. "Intelligent football coaches, like...generals...must have an overall theory on how they expect to win."[8] In general, the cyclic nature of action-counteraction evidenced in the history of football leads football planners away from using information to gain certainty. Instead, information-use focuses on planning for uncertainty and change through the development of better options. In other words, instead of trying to get information about things they cannot control, football planners value information that focuses on what they *can* control. A set of common themes illustrating how football planners theorize about information, demonstrates this concept.

The first theme describing the conceptualization of information in football is that *the value of information lies with the development of better options*. Rather than developing a better plan – a prearranged sequence of events – football planners seek to continually create situations where the decision-maker has several choices. Since the late 1950's, option-centric planning has dominated

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American football.[9] This options-centric focus is a direct result of the accelerated operational-intensity of football described above.

By adopting an option-centric focus, football planners place a higher value on information that concerns what they can control. Football theory evidences this concept in two primary ways. The first way is using information to support preparation. Using information to support preparation means developing better options in order to "plan ahead for *all* contingencies."[10] This generates information-requirements about what is possible, rather than what is probable or intended. For example, determining *exactly* what an opponent is *likely* to do is of less value than knowing everything that opponent is *capable* of doing. "Because preparation is based on probability rather than certainty...you must account for every situation and contingency that can be reasonably anticipated."[11]

The second primary way that football planners focus information-use on things they can control is by planning deception. Deception – the shaping of an opponent's perception - is inherent to option-centric planning. Football planners incorporate deception through the positioning and movement of players and the threat of multiple options. The general idea is to make the "majority of the plays...look enough alike at the start...so that the [opponent] cannot anticipate the point [or method] of attack."[12] Football teams have even achieved deception through successful media-campaigns.[13]

The value for football planners of focusing information on things they can control – preparation and deception – is that this increases their operational tempo relative to an opponent. Preparing multiple-options enables football planners to "confuse and cause hesitation [for opponents try] to adjust to a number of different looks and plays."[14] Deception forces opponents to spend "time [thinking about and planning for] alignments and adjustments, and less time on execution" of their own options.[15] By increasing the tempo of operations through option-centric planning and deception, football planners create their own form of cybernetic paralysis. Valuing information according to its ability to support option development also allows football planners to

refine information requirements into relevant information. This suggests a second theme of how football professionals view information.

The second theme about the conceptualization of information is football is that *flexibility requires the development of relevant information.* As noted above, option-centric planning means being prepared for any contingency. However, preparation alone is not enough – the execution of an option-centric plan requires having the flexibility to shift from one course of action to another. Achieving this flexibility infers that football planners must know what option to select, and when it is required. However, because football professionals need options that address "every possible contingency," the determination of information relevancy requires focus.[16]

Planners achieve a focused relevancy by consolidating information into "workable levels."[17] "Only the information you can get across to the staff and squad will be of value."[18] Therefore, planners analyze their entire situation to identify the specific range of options required. This situational analysis encompasses three categories – the game environment, the opponent, and the friendly team itself.

Football planners conduct situational analysis as a comprehensive process of refinement, distilling the realm of the possible into specific opportunities or requirements. The process entails breaking the larger context of a season, or a game, into smaller pieces – individual 'battles.' Planners then analyze these smaller pieces, determining how often they occur, their impact on the larger context, and the specific opportunities they present.[19] By integrating analysis of the game and the opponent, the process reveals the *range of options* available to an opponent in *specific situations.* It also provides insight about the conditions leading him to select one course of action over another. Furthermore, by integrating this analysis with an analysis of the friendly team, planners are able to discern how to best match friendly strengths against an opponent's weaknesses.[20] The net effect of an integrated situational analysis is an answer to the two questions needed to achieve flexibility, namely: what options to develop, and when to use them. This analysis provides relevant information, resulting in the focused development of friendly

options. The integrated nature of this analysis suggests a third theme of how football planners conceptualize information.

The third theme that illustrates how football planners view information is that *the development of relevant information is a process*. Football planners do not attempt to collect information, categorize it by type, and then pass it on to the individual coaches or players that might need it. Relevant information results from the interaction of a coaching staff – collecting information, analyzing it within a larger context, and integrating it into planning. In other words, relevant information requires a process.[21]

An example that illustrates this conceptualization of information is the interactive manner in which professional football teams use their personnel. To collect information during games, most teams employ an *integrative*, rather than *specialized* approach when assigning information-collection responsibilities during a game. Instead of simply assigning each coach to watch his specific area (for example, having the offensive line coach watching his men blocking), most teams employ a system that "can cover a play from all angles."[22] This provides decision-makers with integrated analysis and recommendations. Furthermore, football teams apply this same integrated approach to the review of opponent performance, during situational analysis.[23]

To summarize this section, a review of football planning theory reveals a set of three trends that describe how the planners conceptualize information. Specifically, in terms of complex systems, football planners judge the value of information according to how it supports the development of options; they view the development of relevant information as the key to building flexibility; and they view information as a integrative process. Considered as a cohesive set, these trends provide critical insight into why football planners use information the way they do.

To fully establish the comparison between the two complex systems considered in this research (operational staffs and football staffs), the remainder of this chapter describes how American football professionals use information to conduct planning. Numerous books, by a variety of football professionals, provide excellent insight into the procedural concepts for

coaching a football team. However, because of differences in specific philosophies, variations in experience, and subjective assessments of what success requires, no coach has offered a single, authoritative, and descriptive schematic to outline football planning as a step-by-step process.[24] Therefore, the football planning process described in this monograph is a graphical amalgamation of several football coaching theory.[25] The process as described, provides a point of comparison for the analytical purpose of this research – not as a formula for coaching success.

Planning a single football game is analogous to the development of an operational-level plan using crisis action planning procedures. Like a military operation, a single football game involves the orchestration of offensive, defensive, and supporting actions.[26] Additionally, these actions can be consolidated into sets, or 'battles' (drives or series), made up of individual 'engagements' (plays). Furthermore, the general one-week period of time for which a professional football team has to plan and prepare its actions is similar to the timeframe required for crisis action planning.[27] Figure 3, below, outlines the process of planning, preparing for, and executing a single American football game.
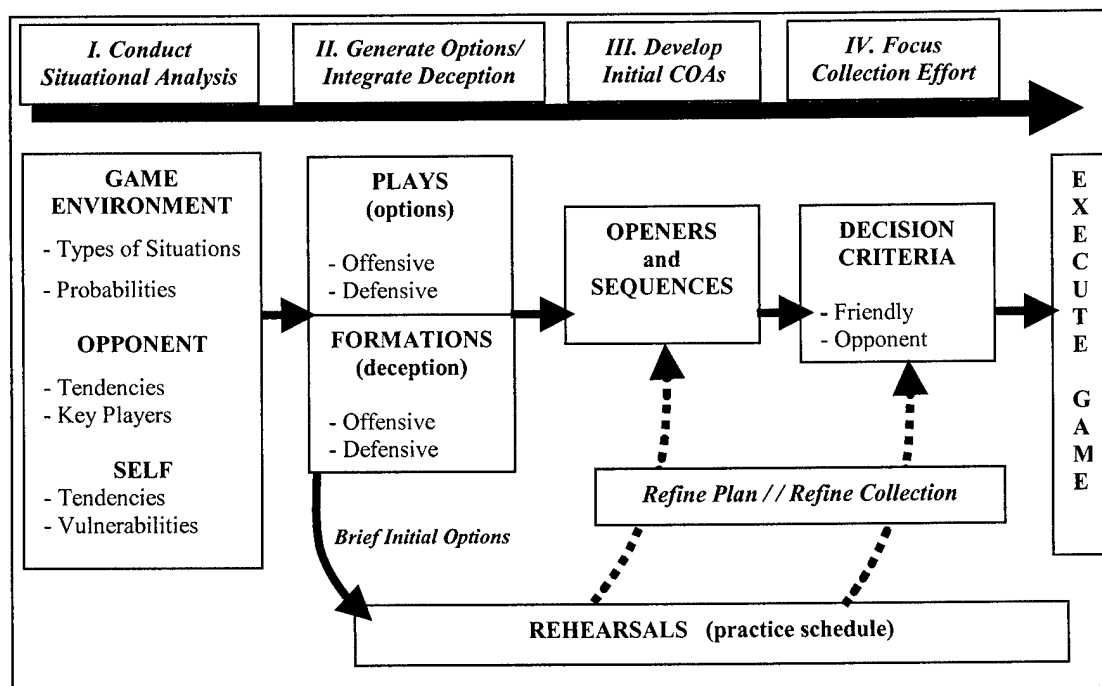

Figure 3 – The "Football Planning Process"

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Based on the themes outlined above, football planning is an option-centric process that uses information to emphasize preparation and flexibility. The fundamental principle of football planning is to "outprepare (sic) the other guy, plan for every contingency, and practice your plan until it comes naturally."[28] Specifically, football planners use information to *focus preparation* and to maximize flexibility by *enabling information to pull decisions*. The following explanation of the football planning process demonstrates how football planners accomplish this.

The first step of the football planning process is situational analysis. Situational analysis focuses preparation by providing planners an accurate assessment of what options they need to develop. Furthermore, the situational analysis supports the development of flexibility by providing planners with insight into the specific information-requirements needed to support these options.

Situational analysis begins with an examination of the game's environment. Specifically, planners determine what types of situation occur most often, and what types of situation are most critical to success. For example, by referencing historical data, planners can determine the number of offensive plays required, and categorize them by specific situation (e.g. 1st downs versus 3rd downs, or series inside the opponents 20-yard line.) Information on the likelihood and magnitude of each critical situation is the start point for answering the question about what options are required.[29] Analysis continues with an examination of the opponent; planners review an opponent's previous performance for tendencies and key players by situation. "Generally the previous three games of the opponent and the games it has played against your team [provides] …enough information."[30] Examining situational tendencies provides planners an idea of an opponent's *range of likely actions* in a particular circumstance. Examining key players – and coaches – provides insight into who "must be controlled."[31] Examinations of the opponent focus preparation by further refining the information about options, and provide the foundation for developing flexibility by identifying situational tendencies of the other team.

The final part of situational analysis is self-examination of the friendly team. In this part of the situational analysis, planners identify how a team's strengths match up against an opponent's vulnerabilities in the situations most likely to happen. This part of the situational analysis is most important because coaches are limited (by time and talent) to using the players they have available. In other words, developing options to capitalize on an opponent's vulnerability "is useless unless [they] can be readily learned and executed by your players."[32] The self-portion of situational analysis concludes the first step, providing football planners with the requisite, relevant information to begin developing options.

The second step of the football planning process is option development and deception integration. The option development step drives preparation. During this step, planners integrate the information gained from situational analysis, and develop a focused plan for preparation. Option development and deception integration involves the selection of plays (options), and the formations from which the plays will begin. Because several plays are tied to each formation, formation-selection begins the integration of deception. After planners determine the plays and formations, the team begins to rehearse (practice), which reinforces the emphasis on preparation.

The rehearsals that begin in step two provide football planners with an ongoing, wargame-like analysis of the options selected. In addition to focusing information on preparation, rehearsals enable the development of flexibility to begin in earnest. By running plays in practice, coaches are able to "scout their own teams," and look at their options from the opponents perspective.[33] This provides coaches with information relevant to developing the information requirements necessary for anticipating enemy actions/reactions, thereby enabling flexibility. Rehearsals also provide insight into which sets of plays work best together, and feed into the third step of the planning process.

The third step of the planning process is the development of COAs. COAs – known offensively as "openers" – are flexible matrices of plays that match a specific sequence of options with specific conditions.[34] For example, a team might prepare and rehearse 15 plays for first

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down, 8 plays for second down, and 10 plays for first down. The opener-sequence (COA) links specific plays together (the #4 first down play with the #2 second down play, followed by the #7 third down play, which sets up the #2 first down play, etc.) This step uses information to focus on preparation by providing coaches and their staffs with a 'plan for the plan.'

Establishing COAs enables flexibility by setting the conditions for information to *pull* decision-making. The concept of information-pull means that a team is ready to execute any one of several options, and that critical information at the point of decision *pulls* the decision-maker to the best option. Planning a set sequence of plays (a COA) allows planners to "test [opponents] to see what [their] game plan is, based on your formations and personnel."[35] Furthermore, by "knowing ahead of time what to expect and when, [staffs] can be much more effective" at gauging an opponent's reactions and tendencies.[36] This leads to the final step of the process.

The last step of the football planning process is the establishment of a focused collection effort. Establishing a system for how information will pull decisions is the "most important [aspect] of finishing a game plan."[37] Football planners create a focused collection effort through two actions. First, they institute a system of matching desired options to situation-based cues or indicators. Usually this involves the development of a written plan or matrix.[38] Second, they specify a detailed system of collection, assigning coaches and assistants to watch different aspects of each play.[39]

This chapter analyzed the conceptualization and use of information by a complex system – an American football team. The high operational-intensity of football has led football planners to view information in a manner that contrasts with military planners and operational theorists. Instead of using information to support a commander's plans, football planners use information to plan for uncertainty by developing options, emphasizing preparation, and instituting flexibility. However, is this a better use of information? While the two systems certainly differ, is one more dynamic than the other? The following chapter answers these questions.

CHAPTER 5

Static versus Dynamic Use of Information

The joint force of 2020 will use superior information and knowledge to achieve decision superiority, to support advanced C2 capabilities, and to reach the full potential of dominant maneuver, precision engagement, full dimensional protection, and focused logistics. The breadth and pace of this evolution demands flexibility and a readiness to innovate.[1]

Joint Vision 2020

If you are waiting for everything to be just right before you take action, you are in possession of a fool-proof excuse for failure.[2]

Homer Rice, *Coaching Football*

The purpose of this chapter is to evaluate whether the U.S. Army's conceptualization and use of information reflects a static or dynamic process. An analysis of contemporary operational theory, concept and process against the previously described model for dynamic information use, accomplishes this. This evaluation frames the answer to the primary research question, and establishes the justification of the thesis proposed at the beginning of the monograph.

As a complex system, the U.S. Army's current conceptualization and use of information results in static operational-level planning. When measured against the model for static versus dynamic information-use, an operational planning staff indicates a static approach to *organization, interaction,* and *improvement.* The analysis outlined below demonstrates this thesis. Furthermore, throughout this chapter, the operational staff is compared to the other complex system described in this paper – the professional football staff – in order to highlight areas in which the two systems can learn from each other.

Static versus Dynamic Organization

Analyzing an operational staff as a complex system against the model for static/dynamic information-use reveals a *static manner of organization.* The organization of operational-level

staffs is the first way in which the U.S. Army's current conceptualization and use of information results in a static approach to planning. This static approach is a direct outgrowth of the theoretical precepts of operations translated in contemporary joint and Army doctrine. Specific examples of how the organization of an operational staff reflects a static use of information include the compartmentalization/specialization of a JTF headquarters and the inadequate doctrinal conceptualization of relevancy.

In review, the organizational criterion of the model for information-use assesses how effectively a system distributes control. Specifically, this criterion measures a system's processes of internal information-distribution. Static systems tend towards the dysfunctional, emphasizing the specialization of skills in the various sub-elements of the systems. This leads to informational barriers that inhibit the understanding and transfer of relevant information. Conversely, dynamic systems are highly functional, and feature processes that reinforce relevancy through the interaction of subordinate elements. Given this, the organization of an operational planning staff can be described as tending towards the dysfunctional.

Two examples demonstrate the dysfunctional nature of an operational planning staff. The first example stems from the doctrine governing the formation and function of JTF staffs. Although the foundation of an operational-level staff is usually a standing service headquarters (such as an Army corps), the requirement for joint representation results in an amalgamation of functional specialists. The "ad hoc" nature inherent to JTF planning staffs raises questions of "knowing, trusting, and being able to rely on" each other.[3] That joint doctrine recognizes and even expects difficulties in the transfer of information among staff members is evident by the specific inclusion of techniques for "familiarization" and integration of JTF staff personnel.[4]

The organizational 'fix' for enhancing staff-member familiarity – segregating the staff into functional compartments – compounds the problem of dysfunctionality even further. As the diagram at Appendix 2 depicts, joint doctrine suggests the establishment of no less than 23 separate "cells," "groups," and "boards."[5] This directed compartmentalization and emphasis on

specialization creates informational barriers that prevent a dynamic integration. Although joint

doctrine does suggest the importance of "interoperability," the clear implication is for staffs to

ensure that technical equipment interfaces.[6] The integrating point of focus for the

compartmentalized JTF staff is the commander. Joint doctrine charges the JTF commander with

focusing the staff on his "vision and concept."[7] However, this notion gives rise to a second

example of organization -- the concept of relevancy.

The contemporary theme of operational theory that *the value(relevancy) of information is*

directly proportional to its ability to support the commander's plan leads the highly

compartmentalized JTF staff to emphasize timeliness over relevancy: "time is the vital factor in

[the commanders] planning."[8] The NCA forms JTF staffs in response to crises, therefore

operational planning is generally urgent and time-sensitive. Integration of information --

coordinating with other cells, sharing information, synthesizing -- uses time, in fact, "integration

is the reverse of timeliness."[9] The emphasis on timeliness of information is paramount in

operational theory and doctrine.[10]

However, as previously noted, a dynamic system generates *relevant* information through the

interaction of separate elements. Because of its emphasis on the commander's plan, this is where

contemporary operational theory leads JTF planning towards a static approach. Operational-level

staffs accept the theoretical notion that the commander provides the only relevancy necessary.

Therefore, staffs regard the rapid delivery of information to the commander as more important

than integrating information to achieve relevancy.[11] In this way, the complex system of an

operational staff becomes a collection of separate "systems attempting to achieve the same ends,

but by different means."[12]

The process of organization reflected by an operational staff's compartmentalization,

specialization, and inadequate view of relevancy, reveals a static use of information. This method

of organization also contrasts with the second complex system analyzed --embodied by an

American football team. As a point of comparison, the coaches, staff, and players of a professional football team present an example of dynamic organization.

A football team evidences a dynamic organizational use of information in two ways. The first way is the de-emphasis of specialization during planning and the second way is the through the development of relevant information achieved by accepting uncertainty. A professional football team's coaching staff approaches its planning process in an integrative fashion. Although coaches are assigned to specialized positions, the Situational Analysis and Development of Options steps of the football planning process are conducted by the staff as an integrated whole.[13] In this way, coaching staffs remove informational barriers and undue focus on specialization.

This approach dovetails naturally into the "system that systematically and expeditiously processes information" that teams establish for collecting information and making decisions during games.[14] Rather than rapidly providing specialized information about one aspect of the game directly to the head coach, coaching staffs take the time to provide a dynamically integrated assessment to assist in decision-making. Having an integrative system of analysis with "a mechanism in place that triggers his involvement," takes tremendous pressure off the decision-maker.[15]

What enables football planners to establish this dynamic, integrative organization is their acceptance of uncertainty. By accepting uncertainty, football planners recognize that no single individual – not even the most experienced head coach – can provide an exact vision or definition of relevancy. Therefore, the unifying aim – the determination of relevancy – in football planning becomes general preparation, rather than detailed development of one person's concept. The result of this approach is that it leads football planners to apply a collective, integrative approach to planning. This aim – the focus on preparation – allows football planners to more accurately and precisely define and develop *relevant* information. Therefore, the *acceptance of uncertainty* – is the first lesson that the complex system represented by football provides for military planners. The logical outcome – general preparation – also affects greatly how a football system

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interacts with its environment. This leads us to the second criterion for evaluating the use of information.

Static versus Dynamic Interaction

Analyzing an operational staff as a complex system against the model for static/dynamic information-use also reveals a *static manner of interaction*. Operational planning uses information statically in the course of interaction with its environment because, by design, the process used for planning is reactive rather than proactive. The reactive nature of operational planning is the direct offspring of the theoretical concept that certainty is possible. Execution of the operational planning process under crisis action procedures is the clearest example of this static nature.

To review the criterion, interaction measures a complex system's ability to exchange information externally. Static systems are responsive or reactive, using information to support selective pre-programmed functions. Dynamic systems anticipate and adapt, using information to shape interaction, rather than respond to it. Systems generally achieve dynamic interaction through the preparation for a large array of possible actions, rather than by striving to attain informational surety. Further, dynamically interacting systems use information to shape perception. Given this, the description of the operational planning process demonstrates a tendency towards the static.

By definition, crisis action planning involves the development of "courses of action in response to specific situations or tasking."[16] However, the final result of the process is a single option, packaged as a "commander's estimate containing the commander's decision on the preferred COA."[17] Furthermore, the doctrine describing the actual conduct of the process limits the number of courses of action that an operational staff could consider, and explicitly curtails the examination and analysis of subsequent or contingency-based events.[18] Additionally, although joint doctrine mentions the importance of developing plans to "influence the enemy disposition

before combat," the crisis planning process fails to integrate any specific procedures for accomplishing this. "Information operations," the term given to "actions taken to affect adversary information and information systems," are adjunctory to operational planning; the integration of "IO" is not directly specified in the explanation of CAP.[19] Even the planning of "deception" is optional.[20]

Joint doctrine bases the operational planning process on the assumption that *relative certainty about a given situation is possible through the development of relevant information*. From this assumption, operational planners gain unwitting confidence in their ability to discern the intentions of an adversary, and plan accordingly. By merely applying forces in synergistic, simultaneous fashion, throughout the depth of the battlespace, the staff can develop the single best option – the only one required. Therefore, the operational planning process requires no mechanisms for developing multiple options, or preparing for uncertainty.

The net result of following the CAP process is a limitation on the planning and preparation of committed forces to a single option – what the commander *wants* to do. The design of the operational plan provides no mechanism for using information to pull the course of action decision; the decision happens before forces are deployed. As the plan is put into action – when forces actually meet in conflict – the operational force is unable to adapt – they are forced to react. Therefore, unless the adversary does exactly what the staff anticipated, all subsequent actions are reactive in nature. Instead of using information to dynamically interact, operational planners attempt to answer pre-programmed information requirements that support or enable a single plan. However, because this certainty is not possible, "operating in this way is to begin from a position of weakness, with actions driven by an adversary, rather than shaping and quelling hazards."[21]

The complex system represented by American football stands in counterpoise to this static use of information. Football planners – driven by years of an operational-intensity that exceeds that of military planning – base planning on an opposite conclusion; since uncertainty is a given,

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it is better to be prepared for anything. The result is a planning process "broad-based enough so any number of situations may be treated as decisive moments."[22] Specifically, football planners achieve dynamic interaction by *planning for change* as evidenced by their focus on preparation, and *shaping perceptions* through the emphasis on deception.

The description of the football planning process in the previous chapter, demonstrates the greater value placed on the development of options. However, "when you face someone…who's prepared themselves especially well, the winner of that contest is apt to be the guy who can adjust more quickly."[23] Having a large range of appropriate responses is not enough to guarantee dynamic interaction; making rapid shifts from one COA to another is not easy – for planners or executors. A football game plan is not so much an expression of a single coach's will, as it is a plan for change – a matrix of the likely situations, likely adversary actions, and advantageous friendly responses. As coach John Madden describes it, a game plan is "the list of plays that we believed would work against the opposing team, depending on the situation and area of field where we had the ball."[24] If this 'plan for the plan' is not "laid out in an organized and efficient way, you may end up discarding your plan…and simply wing it."[25] This format, the fundamental opposite of a single COA, is the first step towards facilitating dynamic interaction.

The second step is thorough preparation – in other words, practice and rehearsals. Rehearsals, which begin in conjunction with the second step of the football planning process, provide football professionals with the opportunity to enhance dynamic interaction in two ways. First, rehearsals increase familiarity with the 'plan for the plan." Through rehearsals, 'tactical forces' (players) gain confidence in their ability to transition from one COA to another; unforecasted or unannounced change can be seen as a sign of panic.[26] Secondly, rehearsals provide football planners with the ability to measure and refine their deception plans. With the dichotomy between plays, and the formations from which they start, shaping perceptions through deception is inherent to football planning. Rehearsals provide football professionals with the ability to conduct the requisite self-analysis to identify their own "tendencies" and "predict what

[an opponent] may do in a given situation."[27] This emphasis on deception enables football planners to integrate dynamic interaction into the plan; through deception, the ability to shape perceptions is 'built into' each separate COA.

In retrospect, the different approaches to interaction evident between these two complex systems – military and football – hinge on the conceptualization of uncertainty. An operational staff develops the single option that provides a commander the most flexibility, despite uncertainty. Football planners start from the other end of the problem: because of uncertainty, enhance flexibility by developing more options – then rehearse to make changing between options possible. An operational staff views changes and/or alternatives to this single option as contingencies. Football planners make a clear distinction between options and contingencies: an option is a part of the plan, a contingency is "plan for an unexpected setback [or]…unanticipated act of providence."[28] This difference between the two complex systems suggests a second lesson for military planners from American football: *prepare for uncertainty*. Learning to do this requires more than generating branches, sequels and contingency plans – it requires a system that integrates multiple options into a base plan, with the requisite mechanisms for selecting options and then switching. However, the ability to learn how to do this also suggests a third point of comparison.

Static versus Dynamic Improvement

Analyzing an operational staff as a complex system against the model for static/dynamic information-use also reveals a *static manner of improvement*. The reasons why operational planning fails to use information for dynamic improvement relates back to the static nature of the system's approach to organization and interaction. Specifically, the static nature of an operational planning staff's organization results in the collection of information without learning. Furthermore, the static nature of staff's interaction with its environment leads to the collection of information without acting.

As a review of the model for static-dynamic information-use, the criterion of improvement measures the ability of a complex system to learn. Static systems take the first step in the learning process by collecting, recording, and/or analyzing information, but fail to act on what they know. Static use of information by a system for improvement is a common trait of traditional bureaucracies.[29] Dynamic systems, on the other hand, institute processes to modify behavior based on the acquisition of information. These processes turn information into action. Given this, the static organization and interaction of an operational planning staff leads directly to static improvement.

As explained above, the compartmentalization of a static operational planning staff creates difficulties in determining the relevancy of information. Compartmentalization preempts adequate processes for the integration of information. Therefore, regarding improvement, although a great deal of data is collected – the system is unable to effectively process, collate, and subsequently learn from it. Systems experts label the tendency of complex systems to generate vast amounts of specialized information without integration – examining the cause/effect relationships of related data – as detail complexity.[30] Also referred to as "fighting complexity with complexity," detail complexity is typical of planning processes such as CAP.[31] An example of how operational planning fights complexity with complexity is a typical joint operations order – an immense document, including all annexes, appendices and its accompanying Time-Phased Force and Deployment Data (TPFDD) file.

The formulaic model of uncertainty (Uncertainty = 'Information-needed' minus 'Information-acquired' proposed in C2 theory explains the tendency towards detail complexity. Given the separated elements of an operational staff, in which relevancy (information needed) is ill defined, the only possible manner of reducing uncertainty is to acquire more information. The mere possession of *more* information, does not equate to *enough* (or even *better*) information; without the proper integration of information, relevancy is indeterminate, and – therefore – the ability of the system to learn dynamically is suspect.[32]

However, even if the organization was corrected, the lack of dynamic interaction by an operational staff would still negate its ability to improve. The static manner of interaction, evidenced by operational staffs in planning, allows staffs to collect information without acting. In theory, operational staffs plan for Information Superiority (IS) by designing ways to maintain or improve friendly situational awareness, while simultaneously decreasing an adversary's ability to do the same.[33] This enables a force to paralyze an opponent cybernetically, and "destroy the enemy's ability to control while protecting one's own."[34] However, the theoretical benefit of Information Superiority is not the ability to *act*, but to increase operational tempo by making "*better decisions* more quickly than their enemies and adversaries" (emphasis mine)."[35] The difference is subtle, yet critical.

The concept of increasing operational tempo through IS, as explained in current operational concept papers and doctrine, contains two critical flaws. First, a complex system such as a military force, has an inherent ability to fend off cybernetic paralysis; when higher echelons of command are disabled, lower echelons automatically assume their functions. "A joint force…may suffer complete cybernetic collapse – the analog to a broken neck – but spontaneously reorganize at lower echelons and continue with its mission."[36] This seriously questions the concept of a force achieving 'better decisions, faster.'

Second, deciding is not acting. Deciding implies analyzing information, considering options, selecting one, making a decision, and communicating that decision to subordinates. At the operational level, this process takes time. Furthermore, "because opposing forces constantly adapt and situations continually evolve, information superiority is relative and transitory."[37] Using this relative information superiority to enable decisions, instead of action, exposes operational planners to the "natural tendency to hesitate."[38] The net result of the static nature of organization and interaction evidenced by an operational planning staff is that the ability to improve is static as well.

Given the evident impact of organization and interaction on improvement, it is easy to understand how the complex system represented by American football presents a dynamic example. The dynamic organization of a football system facilitates a dynamic improvement. The integrated make-up of the planning staff, and the system for collecting information explained previously stand as examples. The de-emphasis on specialization and removal of informational barriers between elements ensures that football planners rapidly translate information into learning. Likewise, dynamic processes of interaction enable football systems to turn collected information into action. The development of multiple options, the matrix orders based on situational conditions, and the emphasis on preparation through rehearsals facilitate a football system's ability to rapidly act. Rather than attempt to increase operational tempo by deciding things faster, football planners generate tempo through options. In option-centric planning, coaches and planners make decisions beforehand – all that they await is the specific situational information to pull them.

This suggests a third lesson that an analysis of football provides for the military planner: *option-centric planning (developing a full range of options and planning for change) is the key to accepting and preparing for uncertainty.* In the same way that the measurement of organization and interaction affect the assessment of improvement, the first and second lessons of football planning lead to this third and final one.

Examining football as an analogy of military operations, within the parameters of the model for static-dynamic information use, provides the operational planner with a relevant point of comparison. The important difference between these systems is *not* that one deals in the realities of combat and the other is a game; the difference of *significance* is that one system – American football has a larger base of relevant, recent experience in exercising its operational planning process. This experience has made football planning more dynamic. Military professionals pride themselves in understanding the past, however, "in football, if any pursuit, the future is educed from the past."[39]

CHAPTER 6

Conclusion

The modern Army commander must free himself from routine methods and show a comprehensive grip of technical matters, for he must be in a position to continually adapt his ideas of warfare to the facts and possibilities of the moment.[1]

Erwin Rommel, *The Rommel Papers*

Good generalship brings great advantage. Generalship in the game means doing the proper thing...playing the proper play at the proper time, in the most effective way.[2]

J.D. Wilce, *Football: How to Play It and How to Understand It*

Based on the evidence and analysis provided in the previous chapters, this monograph concludes that the way the U.S. Army conceptualizes and uses information does in fact lead to a static approach to operational planning. Measured in specific terms of organization, interaction, and improvement, the use of information by an operational planning staff during crisis action planning, tends towards the static end of the continuum. The static nature of information use reflects the direct influence of the operational theory, concepts, and doctrine – in other words, the conceptualization – that influenced the development of the crisis action process.

As a standing point of comparison, the complex system represented by American professional football demonstrates the possibility of achieving a dynamic use of information. Facing similar elements of uncertainty and challenge – but with far more 'operational' experience – football professionals provide the example of another approach. This approach, labeled in this paper as option-centricity, accepts uncertainty by planning and preparing for change.

The current problems with operational planning are not new; nor are they likely to change, if kept on the current trajectory. While the amount of time, effort, and resources dedicated to planning and controlling the use of force have all increased, none "have significantly altered or

even reduced the quintessential problem facing any command system, that of dealing with uncertainty."[3] Furthermore, increasing the technical speed, reach, or processing capacities of information transfer and gathering equipment in the hopes of finally mastering uncertainty is "sheer delusion."[4] What is required is "mental mobility," a reexamination of the fundamental theories regarding information and uncertainty.[5]

The analysis of this monograph suggests that military planners could learn from football planners. In summarizing his analysis of several thousands years of command and control history, Van Creveld concludes:

> Confronted with a task, and having less information available than is need to perform that task, an organization may react in either or two ways. One is to increase its information-processing capacity, the other is to design the organization, and indeed the task itself in such a way as to enable it to operate on the basis of less information. These approaches are exhaustive; no others are conceivable.[6]

This, in a nutshell, explains the difference between the two systems. The U.S. Army, and the joint community continues to explore the info-processing track, while football has learned to work with less information.

Stated another way, the U.S. Army has a plan-centric focus, based on the theoretical 'starting point' that information increases certainty. This point of view unwittingly assumes that certainty is possible. This conclusion leads to the emphasis on and development of a greater amount of technological systems and structural procedures. Conversely, football planners are option-centric, based on the theoretical start point that information decreases uncertainty. This viewpoint assumes (correctly) that certainty is improbable, therefore – taking the logical next step – football planners prepare themselves accordingly.

Implications

Understanding the advantages to option-centric planning is a matter of some gravity for two important reasons. First, in many ways the future is now – but the processes were designed in the past. Developers advertise technological promises of "undreamed of possibilities in clarity and

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speed of real-time intelligence," but base these systems on the battlefields of yesterday.[7] However, the planners and intelligence officers of today face complex, adaptive threats. Increasing the capabilities and technological gadgetry, without re-looking the dysfunctional organization of planning staffs is "insular and parochial."[8] We must "learn to destroy our organizations as we create" new ones that integrate, rather than specialize.[9] Waiting for new technology to fix old organizations, is tantamount to searching for a silver bullet.

The second implication is that a process of developing a single solution – regardless of appropriateness or value – fails to account for the decision-making needs of the National Command Authority. "Choosing among options is the focus" of strategic-level decision-making.[10] In response to crisis situations, the NCA expects operational planners to provide a "wide spectrum of deterrent options and preventive measures," as well as recommendations on the application of force.[11]

Considering the need for options at the NCA level of decision-making, recalls the actions – and frustrations – of the USACOM and XVIII staffs recorded at the beginning of this paper. By working to develop a single, commander-recommended solution, these staffs struggled in vain to accomplish the impossible. Dealing with the situation in Haiti, at home, and abroad, put the NCA in 1994 in a delicate position; careful consideration of all possible options was both necessary and desirable. Had the operational planners understood this, and if they had had an adequate, option-centric process for developing, and executing a range of options, their frustrations may have been lessened.
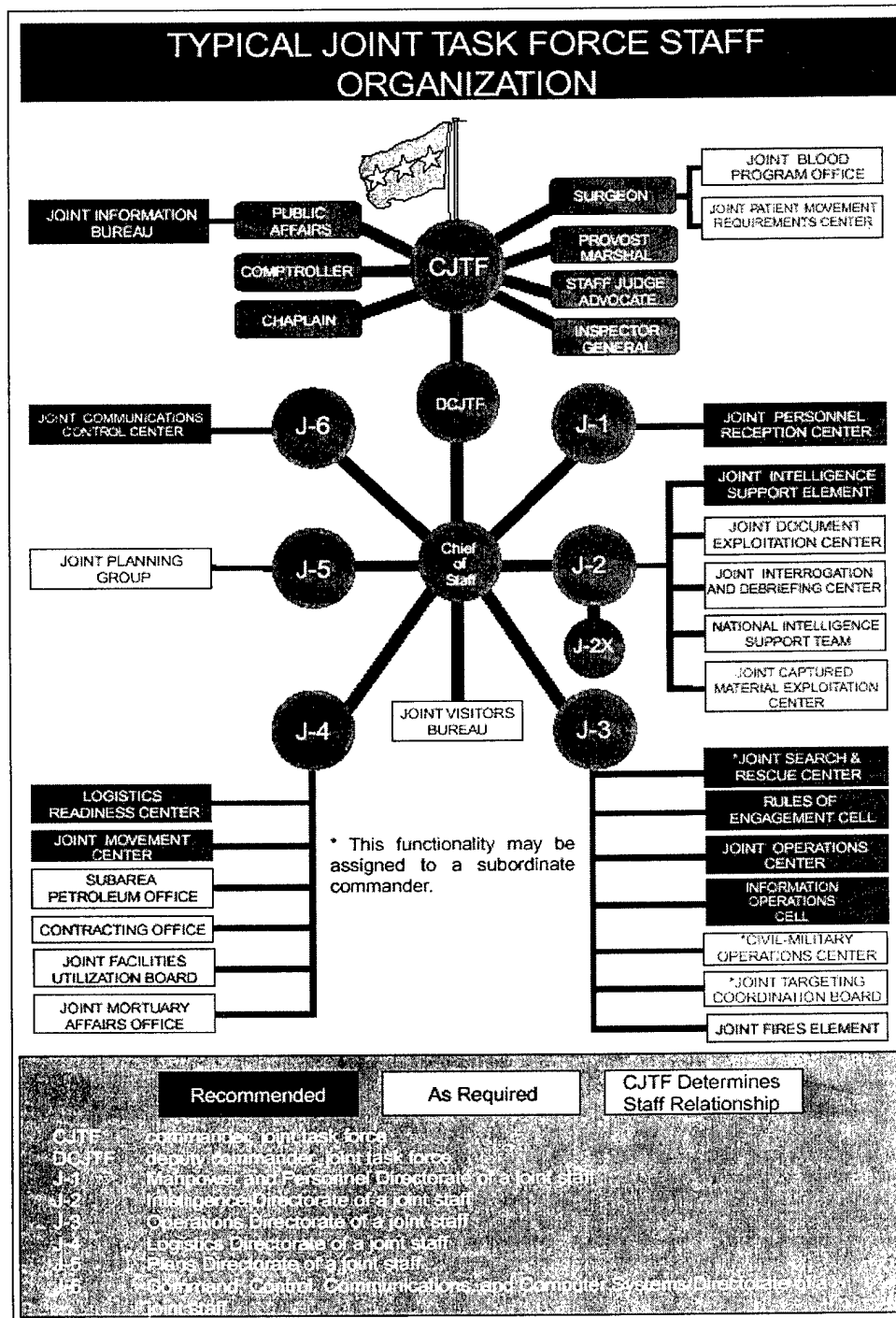
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APPENDIX 1

Analytical Dimensions and Empirical Properties of Living Systems

Static	Dynamic

Organization   Metabolism

Existence (being)
in the absence of external change,
counter to Entropy

Need: Maintenance of matter and energy processing
Control: Fixed programming distributed throughout system

Responsiveness   Adaptability

Experience (behaving)
during the life of one system,
in response to external variation and change

Need: Goal-directed response to external conditions
Control: External input and output with feedback, ability to
reweight or reprogram

Reproduction   Selection

Evolution (becoming)
across generations of programs
through the differential selection of systems

Need: Preservation of programming with advantageous modification
Control: Ability to replicate or otherwise communicate programs to new
generations with high fidelity, some variation

APPENDIX 2

Typical Joint Task Force Staff Organization

TYPICAL JOINT TASK FORCE STAFF ORGANIZATION

Source: U.S. Joint Chiefs of Staff. Joint Publication 5-00.2, Joint Task Force Planning Guidance and Procedures, (Washington, D.C.: Department of Defense), 1999, II-3, Figure II-1.

NOTES

CHAPTER 1

[1] Carl Von Clausewitz, *On War*, ed. and trans by Michael Howard and Peter Paret, (Princeton: Princeton University Press), 1984, 102.

[2] John Madden and Dave Anderson. *One Knee Equals Two Feet (And Everything Else You Need To Know About Football.)* (New York: Villard Books), 1986, 191.

[3] Water E. Kretchik, Robert F. Baumann and John T. Fischel. *Invasion, Intervention, "Intervasion": A Concise History of the U.S. Army in Operation Uphold Democracy.* (Fort Leavenworth: U.S. Army Command and General Staff College Press), 1998, 68-78.

[4] U.S. Joint Chiefs of Staff, *Joint Publication 3-0, Doctrine for Joint Operations.* (Washington, D.C.: Department of Defense), 1 February 1995, V-1. JP 3-0 defines MOOTW as the "range of activities where the military instrument of national power is used for purposes other than the large-scale combat operations usually associated with war." See also, *JP 3-07, Joint Doctrine for Military Operations Other Than War*, 16 June 1995.

[5] Kretchik, Baumann, Fishel, 69.

[6] Ibid, 69.

[7] Ibid, 71.

[8] Ibid, 74.

[9] Ibid, 78.

[10] Paul Zimmerman, "Big D, As in Dynasty," *Sports Illustrated*, Vol. 78, no. 5 (February 8, 1993): 52.

[11] The Associated Press, "Detroit 20, Dallas 17, OT," (New York: The News and Observer Publishing Company).

[12] James Lawton. *The All American War Game."* (Oxford, England: Basil Blackwell Publisher, Ltd.), 1984, 3.

[13] U.S. Army. *Student Text 3-0, Operations,* (Fort Leavenworth: U.S. Army Command and General Staff College), 19 October 2000, 4-10. The concept of Information Superiority is examined in greater detail in Chapter 3 of this monograph. See also chapter 11 (Information Superiority).

[14] For a more in-depth discussion of how football coaches develop plans see: Homer Smith, *A History of Football Concepts*, Manual 15 of 17 in the *Coaching Offensive Football* Series, (Tuscaloosa, AL: Homer Smith), 1999; or Tom Flores and Bob O'Connor, *Coaching Football.* (Chicago: Masters Press), 1993.

[15] As a point of clarification, a system is generally defined as a "set of elements standing in interrelation" that requires "an understanding not only [of] the elements but their interrelations as well." The term 'interrelation' refers to how separate elements within a system interact, as well as how the system as a whole interacts with its environment. A *complex system* is a system in which the 'interrelated' elements are systems themselves – in effect a 'system of systems.' Most social organizations – such as armies and football teams – fit the description of a complex system. Ludwig von Bertalanffy, *General System Theory*, revised ed., (New York: George Braziller, Inc.), 1968, xix, 9, 38.

CHAPTER 2

[1] J.F.C. Fuller, *The Foundations of the Science of War*, (London: Hutchison & Co., Ltd), 1926, reprinted by the U.S. Army Command and General Staff College Press, 1993, 102.

[2] Lawton, *All American Wargame*, 35.

[3] *Webster's Comprehensive Dictionary – International Edition* (1987), s.v. "information."

[4] Carl Von Clausewitz, *On War*, ed. and trans by Michael Howard and Peter Paret, (Princeton: Princeton University Press), 1984, 102. Clausewitz observed: "Usually, of course, new information and reevaluation are not enough to make us give up our intentions: they only call them in question. We now know more, *but this makes us more, not less uncertain.*" (My italics).

[5] For a comprehensive review of current research on information use (especially as it applies to military planning and decision-making), see: Patricia A. Jacobs and Donald P. Gaver, *Human Factors Influencing Decision Making.* NTIS, AD-A351 910. Monterey: Naval Postgraduate School, 1998. For research dealing specifically with the impact of 'data-overload' and uncertainty of information, see: P. Wright, "The Harassed Decision-Maker: Time Pressures, Distractions, and the use of Evidence," *Journal of Applied Psychology*, 59 (1974): 555-561; John Payne, James Bettman, and Eric Johnson, "Behavioral Decision Research: A Constructive Processing Perspective," *Annual Review of Psychology*, vol.43, (1992); 87-116; and J.E.V. Johnson and A.C. Bruce, "Risk Strategy Under Task Complexity: A Multivariate Analysis of Behaviour in a Natural Setting," *Journal of Behavioral Decision Making*, 11 (1998): 1-17. The above listed studies suggest that an "overload" of information causes several problems, including: 1) more information is collected than is used (Wright), 2) Recent information is used instead of relevant information (Payne, Bettman, Johnson), and 3) increased levels of information lead to corresponding increases in "ambiguity," making decision-making harder (Johnson and Bruce).

[6] Bertalanffy, *General System Theory*, 38. See note 13, Chapter 1, above.

[7] James J. Schneider, "Cybershock: Cybernetic Paralysis as a New Form of Warfare," reprinted in *Military Theory Readings* (School of Advanced Military Studies Program Text). (Fort Leavenworth: U.S. Army Command and General Staff College), 16 June 1995, 8.

[8] James R. Beniger, *The Control Revolution.* (Cambridge, MA: Harvard University Press), 1986, 7.

[9] Ibid, 8.

[10] Ibid, 434.

[11] Ibid, 8-9.

[12] Ibid, 65-66, 110. As asserted in the text, these three functions are not directly attributable to Control Theory, but were derived from an analysis of the subject. The most direct influence of the definition of these 'functions' can be attributed to Beniger's model of system evolution that this note cites.

[13] Bertalanffy, 47-48.

[14] M. Mitchell Waldrop, *Complexity.* (New York: Simon and Schuster), 1992, 11.

[15] Ibid.

[16] Beniger, 58-59.

[17] Ibid, 434.

[18] Ibid, 111.

[19] Ibid, 110. See also note 9, above.

[20] Ibid, 121.

[21] Vicki L. Gregory, "Knowledge Management and Building the Learning Organization," in in T. Kanti Srikantaiah and Michael E.D. Koenig (Eds.)*Knowledge Management for the Information Professional* (pp.161-179), (Medford, NJ: Information Today, Inc.), 2000, 167.

[22] Ibid, 172.

[23] Ibid, 163.

[24] Mark Addleson, "Organizing to Know and Learn: Reflections on Organization and Knowledge Management," in T. Kanti Srikantaiah and Michael E.D. Koenig (Eds.), *Knowledge Management for the Information Professional* (pp.137-160), and trans by (Medford, NJ: Information Today, Inc.), 2000, 149.

[25] Beniger, 108.

[26] Addleson, 145-147.

[27] C. Argyris, "Teaching Smart People How to Learn," *Harvard Business Review*, Vol. 70, no. 3, (1991): 327-340.

CHAPTER 3

[1] U.S. War Department, *Field Service Regulation 100-5, Operations*, (Washington D.C.: U.S. Government Printing Office), 1941, 24.

[2] Jack Olcott, *Coaching the Quarterback.* West Nyack, NY: Parker Publishing Company, Inc.), 1972, 29.

[3] Schneider, "Cybershock," 6; and Martin Van Creveld, *Command in War.* (Cambridge, MA: Harvard University Press), 1985, 7-10. This concept is apparent in Schneider's description of the five ways a

"complex military system uses information," and Van Creveld's description of "command functions" and "means of command."

[4] Schneider, James J. "What If We Fight Tonight? Advanced Military Education for the XXIst Century," *Association of Advanced Operational Studies NET CALL*, vol. II, no. 2 (Fall-Winter 1994-95): 5.

[5] Charles N. Eassa, "U.S. Armed Forces Information Operations, Is the Doctrine Adequate?," SAMS Monograph (Fort Leavenworth: U.S. Army Command and General Staff College), 1999, 5.

[6] U.S. Joint Chiefs of Staff, *Joint Vision 2020*. (Washington, D.C.: U.S. Government Printing Office), 2000, 23.

[7] Headquarters, U.S. Army Training and Doctrine Command, Tradoc Pamphlet 525-75, *Intel XXI – A Concept for Force XXI Intelligence Operations*. (Fort Monroe: U.S. Army Training and Doctrine Command), 1996, para 2-3, b. (1).

[8] Note – for purposes of this research, "C2 theory" refers to the body of scientific study – currently ongoing – that deals with the theoretical (vice technical) aspects of command and control. Of note, current joint doctrine has over 18 different publications (and four more in draft) concerning the definition and importance of C2 (according to: Headquarters, U.S. Joint Warfare Center, *Joint Command and Control Doctrine Study*, (Fort Monroe: Joint Warfare Center), 1999, III-1.

[9] Van Creveld, 264,

[10] Alexander H. Levis and Michael Athans, "The Quest for a C3 Theory: Dreams and Realities," in *Science of Command and Control: Coping With Uncertainty* (pp.4-9), ed by Dr. Stuart Johnson and Dr. Alexander H. Levis. (London: AFCEA International Press), 1988, 6-8.

[11] Ibid, 7. Levis and Athans use the word "knowledge:" $U = K_n - K_a$.

[12] Ibid.

[13] Jim Storr, "Real People, Real Decisions: Designing HQs to Win Wars," British Army Review, no.123 (1999), 18. See note #5 in particular – Storr notes that staffs attempt to reduce uncertainty by creating large amounts of information, with little regard to its relevancy .

[14] Headquarters, U.S. Army Training and Doctrine Command, Tradoc Pamphlet 525-5, *Force XXI Operations*. (Fort Monroe: U.S. Army Training and Doctrine Command), 1994, para 3-1, a., (5), b.

[15] Ibid, para 1-2, e., (5); and Tradoc Pamphlet 525-66, para 3-2, d., (1).

[16] *Student Text 3-0, Operations*, chapter 11.

[17] Ibid, 11-10.

[18] Van Creveld, 267.

[19] Levis and Athans, 8.

[20] *Student Text, 3-0, Operations*, 11-1.

[21] *Joint Vision 2020*, 10.

[22] Schneider, "Cybershock," 10.

[23] Ibid.

[24] *Student Text, 3-0, Operations*, 11-2.

[25] *Joint Vision 2020*, 11.

[26] TRADOC Pam 525-5; TRADOC Pam 525-75

[27] *Joint Vision 2020*, Chapter 2.

[28] *Student Text, 3-0, Operations*, 11-8.

[29] *Joint Publication 3-0, Doctrine for Joint Operations*, II-2.

[30] U.S. Joint Chiefs of Staff, *Joint Publication 5-03.1, Joint Operation Planning and Execution System*, Vol.1 (Planning Policies and Procedures). (Washington, D.C.: Department of Defense), 4 August 1993, I-1.

[31] Ibid.

[32] U.S. Joint Chiefs of Staff, *Joint Publication 5-00.2, Joint Task Force Planning Guidance and Procedures*. (Washington, D.C.: Department of Defense), 13 January 1999, II-4.

[33] Ibid, I-1. The National Command Authority has several options for JTF Headquarters development, including the augmentation of a standing service organization (like a U.S. Army Corps HQ) or the formation of a completely new, ad hoc organization.

[34] Ibid, II-2. See also chapter IX. JP 5-00.2 suggests that it may take 2-3 days before JTF planning staffs become fully functional.

[35] Ibid, IX-6.

[36] Ibid, IX-11.

[37] Ibid, V-1.

[38] Ibid, I-3.

[39] U.S. Joint Chiefs of Staff, *Joint Publication 5-0, Doctrine for Planning Joint Operations,* (Washington, D.C.: Department of Defense), 13 April 1995, III-9.

[40] *Joint Publication 5-00.2, Joint Task Force Planning Guidance and Procedures,* IX-1.

[41] *Joint Publication 5-03.1, Joint Operation Planning and Execution System,* V-8.

[42] *Joint Publication 5-0, Doctrine for Planning Joint Operations,* I-19,20

[43] *Joint Publication 5-03.1, Joint Operation Planning and Execution System,* Annex D

[44] *Joint Publication 5-0, Doctrine for Planning Joint Operations,* I-19,20

[45] *Joint Publication 5-00.2, Joint Task Force Planning Guidance and Procedures,* IX-3.

[46] Ibid.

[47] Ibid, II-3.

[48] See Appendix 2. Note that there are 23 separate cells, boards, and other subdivisions of the "typical" JTF staff.

CHAPTER 4

[1] Quote by General MacArthur taken from: James S. Edson, *The Black Knights of West Point, Vol.1,* (New York: Bradbury, Sayles, O'Neill Co. Inc.), 1954, 8.

[2] Quote by Knute Rockne taken from: Mike Bobo and Spike Dykes, *Principles of Coaching Football.* (Boston: Allyn & Bacon), 1987, 47.

[3] *Student Text, 3-0, Operations,* 1-16. FM 3-0 suggests that the "Full Spectrum" of any operation includes aspects of offense, defense, stability, and support; the amount and nature of each changes through phases of an operation and differs according to the level of war. Football provides a similar 'spectrum:' each game has aspects of offense, defense, special teams, and requires the support of administrative and health-service personnel.

[4] Lawton, *The All American Wargame,* 3.

[5] Bill Walsh and Brian Billick. *Finding the Winning Edge.* (Champaign, IL: Sports Publishing, Inc.), 1998, chapter 1. See also: Bobo and Dykes, chapter 15. Both these books dedicate entire sections on developing and managing relations with media and owners/administrations.

[6] Smith, *A History of Football Concepts,* 1.

[7] Bobo and Dykes, 43.

[8] Flores and O'Connor, *Coaching Football,* 11.

[9] Smith, 7-15. Smith designates Oklahoma's "Split-T" offense, used throughout the 1950's, as the "first great option offense" and demonstrates how the option-orientation has dominated planning ever since.

[10] Brian Billick, *Developing an Offensive Game Plan.* (Champaign, IL: Coaches Choice Books), 1997, 33.

[11] Walsh and Billick, 216.

[12] Lynn O. Waldorff, *The Game of Football,*(New York: McGraw-Hill Book Company, Inc.), 1952, 22.

[13] Flores and O'Connor, 192. In Chapter 20, the authors present the example of the Rams-Cowboys 1986 playoff game and the Chicago Bears' use of William Perry as an fullback.

[14] Billick, 72.

[15] Hayden Fry and Bill Snyder, "Gaining a Pre-Snap Advantage," in *Offensive Football Strategies,* (Champaign, IL: Human Kinetics), 2000, 27.

[16] Walsh and Billick, 216.

[17] Billick, 8.

[18] Deitzel, *Coaching Football,* ( ), 19 , 217

[19] Billick, 63.

[20] Flores and O'Connor, 200.

[21] Billick, 6.

[22] Ibid, 83-86. Professional teams generally have a staff of assistants that aid coaches by watching specified aspects of the game. Although these assistants might not be able to provide immediate analysis to decision-makers, most teams have a procedure for 'pulling' this information as required.

[23] See Flores and O'Connor, 173-182; and Jack Bicknell and Sam Timer, "Communicating the Plan," in *Offensive Football Strategies*, (Champaign, IL: Human Kinetics), 2000, 21-22.

[24] Billick, 5 and 83; and Flores and O'Connor, 11. Billick suggest that the "scope of variations facing a coach in high school, college, or professional football can be quite diverse." Flores and O'Connor point out that "theories of winning" are individual and unique, and therefore the processes employed for planning stem from personal preference.

[25] For examples see: Billick, *Developing an Offensive Game Plan*; Bobo and Dykes, *Principles of Coaching Football*; and Flores and O'Connor, *Coaching Football*. These works provided the source material for the development of Figure 3.

[26] See note 3 – Chapter 4, above.

[27] *Joint Publication 5-03.1, Joint Operation Planning and Execution System,* V-1 to V-3. CAP procedures are designed to "respond to any crisis within a constrained timeframe." However, given the necessities for NCA, CJCS, and CINC review and approval processes, a one-week timeframe for CAP is, if anything, a conservative estimate.

[28] Bobby Bowden and Ben Brown, *Winning's Only Part of the Game: Lessons of Life & Football.* (New York: Warner Books, Inc.), 1996, 214.

[29] Billick, 15. This system, which Billick developed while working for Bill Walsh at Stanford, is explained in great detail in chapter 2 of this book.

[30] Flores and O'Connor, 183.

[31] Ibid, 184.

[32] Billick, 6. Additional evidence the importance of self-analysis comes from Billick's depiction of a typical week. His sample schedule (pages 74-75) utilizes 14.5 hours of practice-time a week for coaches and players to review video of their own games, as opposed to 5 hours of watching videos of opponents! Coach Bowden (Bowden and Brown, 207-8) also highlights the importance of self-analysis. Lawton (Lawton, 32) emphasizes this concept by pointing out that the first use of film to review games (George Halas of the Chicago Bears) was used to assist players by showing them what *they* had done (or not done.)

[33] Flores and O'Connor, 184-5.

[34] Billick, 32. Defensively, the establishment of set COAs is not preferred (see Smith, 13).

[35] Billick, 34. See also, Flores and O'Connor, 187.

[36] Ibid.

[37] Ibid, 83.

[38] Ibid. Billick's system does, however former coach John Madden advocated a system based on a coaches "gut feel." (Madden and Anderson, 191).

[39] Ibid, 84-86.

CHAPTER 5

[1] *Joint Vision 2020*, 12.

[2] Quote by Homer Rice taken from: Flores and O'Connor, *Coaching Football*, 10.

[3] *Joint Publication 5-00.2, Joint Task Force Planning Guidance and Procedures*, II-2.

[4] Ibid, II-4.

[5] Ibid.

[6] Ibid, II-2.

[7] Ibid, II-1.

[8] *Joint Publication 5-0, Doctrine for Planning Joint Operations*, I-1.

[9] Eassa, "U.S. Armed Forces Information Operations," 34.

[10] Examples include:

[11] *Student Text, 3-0, Operations*, 11-10/11. This notion is reinforced by FM 3-0's definition of relevancy, previously discussed, which (weakly) defines relevancy as "information of importance to the commander," and classifies it in terms of timeliness, accuracy, usability, precision, and reliability...but *not* integration.

[12] Eassa, 38.

[13] Bowden and Brown, *Winning's Only Part of the Game*, 207-8; see also: Billick, *Developing an Offensive Game Plan*.

[14] Walsh and Billick. *Finding the Winning Edge*, 317.

[15] Ibid, 325.

[16] *Joint Publication 5-0, Doctrine for Planning Joint Operations,* I-4. Italics added by this author for emphasis on the plurality joint doctrine's expectation.

[17] Ibid, III-3/4.

[18] *Joint Publication 5-00.2, Joint Task Force Planning Guidance and Procedures,* IX-40 to 46.

[19] U.S. Joint Chiefs of Staff, *Joint Publication 3-13, Joint Doctrine for Information Operations).* (Washington, D.C.: Department of Defense), 9 October 1998, I-1.

[20] *Joint Publication 5-00.2, Joint Task Force Planning Guidance and Procedures,* IX-40 to 46. The JTF Planning Procedure states that the commander may specify deception guidance"if used" (IX-40).

[21] Thomas J. Kardos, "Information Superiority: Seeking Command of the Cyber-Sea," SAMS Monograph, (Fort Leavenworth: U.S. Army Command and General Staff College), 1999, 27.

[22] Walsh and Billick,

[23] Bowden and Brown, 204.

[24] Madden and Anderson. *One Knee Equals Two Feet*, 191.

[25] Billick, *Developing an Offensive Game Plan*, 84.

[26] Ibid, 66.

[27] Bobo and Dykes, *Principles of Coaching Football*, 51.

[28] Walsh and Billick, 275.

[29] Addleson, "Organizing to Know and Learn," 137.

[30] Peter M. Senge, *The Fifth Discipline.* (New York: Currency Doubleday), 1990, 71-72.

[31] Ibid.

[32] See discussion of the illogical nature of information in Chapter 2.

[33] *Student Text, 3-0, Operations*, 11-2.

[34] James J. Schneider, "Black Lights, Chaos, Complexity, and the Promise of Information Warfare," reprinted in *Military Theory Readings* (School of Advanced Military Studies Program Text). (Fort Leavenworth: U.S. Army Command and General Staff College), 28 July 1996, 3.

[35] *Student Text, 3-0, Operations*, 11-2.

[36] Schneider, "Blacklights," 14.

[37] *Student Text, 3-0, Operations*, 11-2.

[38] Ibid, 6-9.

[39] Smith, *A History of Football Concepts*, 54.

CHAPTER 6

[1] Erwin Rommel, *The Rommel Papers.* Ed by B.H. Liddell Hart, (New York: Harcourt, Brace and Co., 1953, ix.

[2] J.W Wilce, *Football – How to Play It and How to Understand It.* (New York: Charles Scribner's Sons), 1923, 119.

[3] Martin Van Creveld, *Command in War*, 268.

[4] Ibid, 266.

[5] Fuller, *The Foundations of the Science of War*, 253.

[6] Van Creveld, 269.

[7] Peter Harding, "C3I Supporting the Commander's GAME Plan," in Clarence McKnight, ed., *Control of Joint Forces – A New Perspective* (pp.35-42), (Fairfax, VA: AFCEA International Press), 1993, 38.

[8] Wayne M. Hall, "Information Operations: Military Competition," *Cyber Sword*, Vol. IV, No. 2 (Fall 2000): 8.

[9] Ibid.

[10] Richard E. Neustadt and Ernest R. May, *Thinking in Time – The Uses of History for Decision Makers*, (New York: The Free Press), 1986, 136.

[11] Joint Chiefs of Staff, *The National Military Strategy*, (Washington D.C.: The Joint Staff), 1996, 11.

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